



ISSD NEWSLETTER

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Note From the Editor



ppportunity - that's the key word! **ISSD** offers people an opportunity to learn more about those frogs we enjoy so much. When I first began with this hobby there was literally nothing available (in English) to guide the novice collector. These Newsletters have helped me a great deal and I trust that they have helped others as well.

While the keeping of Dart-Frogs in terrariums has been a popular hobby in Europe for many years, it has been a hobby in its infancy in the U.S. until recently. A few years ago it was virtually impossible to obtain captive bred specimens in the U.S.. Sporadic sales of wild caught specimens by wholesalers offered the only opportunity to obtain Dart-Frogs at all. Again, that key word - opportunity. Now there are breeders who are consistently producing frogs and distributing them around to other collectors. I would like to believe that **ISSD** has played a pivotal role in these encouraging developments.

Through the generous attitude of our European friends, as it regards their willingness to share with us their expertise, we have learned much. Each of the past ten editions of the **ISSD** Newsletter has had at least one contribution by a European author. For this we are grateful! This edition is no exception; Milan Soukup of Prague, Czechoslovakia gives us a short account of his experiences with the keeping and breeding of *Dendrobates tricolor*. Luuk Bauer of Den Haag, Holland gives us a paper which tries to make some sense of the confusing business of scientific nomenclature. Shortly after the formation of **ISSD**, a Dutch

Dendrobatid Society was formed. A key player in that society is our friend Hans Zwoferink, who in this edition tells of his experiences with *Dendrobates variabilis*.

It seems that most of the material submitted for publication is somewhat similar in its format - This is how I keep and breed this or that species. These are the papers from which we learn the most. However, some variety is nice once in a while. I personally am fond of travelogues. I had a great deal of fun writing a travelogue about my quest for *D. pictus* and my trip to Brazil. In this edition we have such a paper. A Couple of Yankees in Dendrobatid Habitat, by Phil and Ann Jesup. Many thanks to these folks for sharing with us the fun and excitement of their trip to South America. This brings to mind a curious phrase that I read in a bit of correspondence with a German friend. I had asked him why it was so that there were so many more species available to the German collector, and where these all came from. He said "most of those rare species which we have we have got by adventure". Aptly put! That's what any trip to the jungle is - an adventure, lets have more of these travelogues.

Since we began this with the theme of opportunities, what lies ahead? The opportunity to build on the foundation that has been laid, to take **ISSD** into its third year with the expectation of better things yet to come. To make the Newsletter ever better, under the guidance of a new Editor. To stimulate the members to become aware of, and interested in, rain-forest environmental concerns. To broaden the base of our captive populations, etc. etc.. Opportunities abound - lets press ahead!

DB

A Couple of Yankees in Dendrobatid Habitat

by: Phil & Ann Jesup

"There he is!!" - Somehow, there is nothing more exciting than seeing, in the wild, an animal or plant which has captured your interest and which you have been keeping in captivity or cultivating. We are orchid and dendrobatid frog enthusiasts and had the pleasure of seeing both life forms in their natural habitat on a trip to Ecuador in January, 1989.

Much of our time was spent searching for orchid species in areas recently opened to exploration by the construction of new roads. We were exploring in the Andes at elevations of approximately 1500 - 3200 meters, too high generally for dendrobatids. However, early in the trip we, along with our botanist friend and his wife, were invited guests at the Rio Palenque Science Center which is located at an elevation of 220 meters in the Pichincha Province in northwestern Ecuador. The Center was formerly a field station for the University of Miami and has since been privately acquired by an American botanist and his Ecuadorian wife. We were told that the Center's facilities are made available, upon application, to scientists working in various research disciplines.

We perked up our ears when our hosts, hearing of our interest in dendrobatids, told us that the Center's property had a natural population of *Dendrobates histrionicus* and that tadpole transportation was a frequently observed phenomenon. We also learned that a herpetological research team had recently discovered a new dendrobatid species, literally a few hundred yards from the house. This was all we needed! Although we had seen orchids growing in-situ on various occasions in the west Indies, our involvement with dendrobatids is relatively new and we never imagined that we would have a chance to observe them in their natural habitat, with whatever clues for captive husbandry this might bring.

Unfortunately we arrived at the Center in the afternoon and our schedule called for us to be on the road again by 7:30 the following morning. Our first, and very

pleasant duty was to visit the cultivated collection of Ecuadorian orchids which was maintained on the property in a small open air lath house at the edge of the lawn, bordering on the forest. As we perused the orchids we suddenly heard a familiar sound, almost comfortingly so, among the many sounds so totally foreign to us in the lowland rainforest. Those who keep *Dendrobates histrionicus* or *D. lehmanni* know that certain (and apparently only certain) males when disturbed will make a rasping call similar to "singing" but a bit slower and of shorter duration, what we call "complaining". We had been hearing this familiar sound only a few days before, but in frigid mid-winter Connecticut (in our frog room that is). It was clearly a *histrionicus*, somewhere within the lath house and no doubt reacting testily to the disturbance caused by two large two-legged arthropods clambering around. The sound was ventriloquial, as anurian calls tend to be and it ceased after a couple of seconds so that we were unable to locate the caller.

The Rio Palenque Science Center boasts of nearly four hundred acres, bordering on the Palenque river, of healthy virgin lowland forest (as contrasted with what is termed "cloud forest" in the higher montane areas). There are also areas of mature oil palm cultivation. It is really a remnant since much of the surrounding area is under intensive cultivation or is being used as cattle pasturage. Since the *Dendrobates histrionicus* range is restricted to Colombia and the adjacent Esmeraldas and Pichincha Provinces of Ecuador, and since the Science Center is at the southern front of the Pichincha Province, with little or no undisturbed suitable habitat remaining south of the Rio Palenque, this small remnant patch is very likely the southern extreme of the *histrionicus* range.

During a delightful dinner, punctuated with much orchid and natural history talk, the rains came with abandon. Shortly the electricity went off as the result of a wet branch on the wires, and we resorted to candles and hurricane lamps. After hours more of talk about the natural wonders of Ecuador and lamentations over the destruction of the same by the hominid species that our little friend in the orchid hutch had been so bitterly complaining about earlier, we "hit the sack". Our alarm was set to wake us a dawn, at which time we hoped to scout the nearby jungle in search of the elusive little jewel-frogs whose feisty,

cantankerous behavior held such power to move us to wonderment.

Dawn and the sound of the alarm came with, alas, the same hard pounding of rain and an incredible (to us temperate zone types) cacophony of bird sounds, different, to say the least, from the sounds that greeted the dawn back home. We "Gringos" must have looked somewhat out of place, but we remained undaunted by the rain, after all were we not in a rain-forest? Phil sported a yellow poncho while Ann carried an umbrella. We stuck to the path, pretty much, and the narrow dirt (mud) access road. The splattering noise of the steady rain drowned out all potential frog calls except those at very close range. The constant movement of the leaves under the cascading rain made it equally impossible to detect motion on the ground. After about a half-hour of fruitless searching we were ready to return for breakfast and prepare for our departure. We had just started back when Ann heard a familiar repetitive hoarse calling only a few feet from the road. It always seems that ones search yields results just at the time when one is preparing to depart! We carefully worked our way toward the sound through tall trees with a relatively sparse undergrowth of shrubbery heavily entangled with vining aroids. The ground was littered with the rapidly decaying remanent of dead branches and rather large leaves that had fallen from the trees. As we approached, the frog periodically ceased his protestations only to resume them again shortly as we paused in silence. Suddenly we saw it on a leaf about eighteen inches above a tangle of vines and brush, positioned so as to realize some shelter from the rain from an overhanging leaf. "THERE IT IS"!!

"It" was a relatively drab color form, dorsally dark blackish brown with brownish-orange markings. No matter, it was our first wild dendrobatid! As we inched towards it to get a better view, it dove off the leaf and disappeared into the tangle below. At this point we heard another individual calling a few feet further in. The approach through the dense vegetation was quite restricted, so Ann move towards it alone. She found two frogs, a non-calling individual (female?) on a leaf above the calling male. They were as easily spooked as the first one. Where was that alleged boldness that distasteful skin toxins is supposed to produce? Meanwhile Phil heard another call from the opposite side of the road. This pursuit was likewise fruitless as he failed to see the frog.

We hurried back towards our waiting breakfast but briefly diverted our course towards the heavily vegetated slope behind the orchid house. This was the spot which our host had pointed out to us as the type locality of the recently discovered "new" dendrobatid. We half slid down a muddy overgrown path towards a very small creek where we heard at least two calling frogs, their voices sounding much like the high trill of *Epipedobates anthonyi*. They were apparently positioned in undergrowth somewhere above the ground. Frustrated by the impenetrability of the forest we soon gave up the search and climbed back towards the house and breakfast, sodden but exhilarated.

What follows is another in our series of "verbatim" articles, being quoted to keep our members updated on the "Spike" controversy. It appeared in Times of America on September 20th, 1989.

We believe that the application of herbicides to coca fields in Peru and elsewhere is a foolhardy policy which will have little or no effect on the production of cocaine in South America. It, however, has great potential for serious ecological harm. We are calling on all **ISSD** members to write letters of protest against this policy.

Currently there is great political pressure on the Bush administration to take some strong measures in the so called War-On-Drugs. We believe that this renders the government somewhat insensitive to the concerns of environmentalists; however we are still urging that letters of protest be sent to key members of the Bush administration, most especially "Drug Czar" William Bennet. Letters should be addressed to Mr. Bennet and sent to: Bureau of International Narcotic Matters, the State Department, Washington, DC.. During the last presidential campaign, Mr. Bush personally portrayed himself as an "environmentalist". We ask our members to write to Mr. Bush to encourage him to take that title seriously, specifically as it regards this ill advised policy. We think that it is quite important that these letters of protest reflect international concern and so are urging all non-U.S. citizen **ISSD** members especially to write.

We do perceive that there is a sensitivity to this issue at Eli Lilly & Company (the manufacturers of Spike). We would like to believe that their opposition to the use of their product reflects a true concern for the environment. At the very least, it is clear that they are sensitive to their corporate image as it relates to these policy decisions. We would like them to know that the world herpetological community and environmentalist everywhere **WILL** consider them culpable in any environmental disaster precipitated by the use of Spike, regardless of whether its use is sanctioned by them or not. Therefore, we are urging all **ISSD** members to write letters

of protest concerning the use of Spike to: Eli Lilly & Company, Lilly Corporate Center, Indianapolis, Indiana, U.S.A., 46285. We hope that this public pressure will encourage Eli Lilly & Company to continue their efforts to block the use of Spike in South America.

It should be added that Dow Chemical and DuPont Corporations are logical targets for our letters of protest as well. Unfortunately, at this time, I cannot provide addresses to which the letters should be sent. Anyone with such information relating to Dow or DuPont is encouraged to provide it to us for publication in the next newsletter.

Anyone wishing to express his/her opinion on these matters (for publication in the newsletter) should feel free to write to the newsletter editor.

Anti-Coca Herbicides Threaten Peruvian Rainforest

by Karen Perkins
Council on Hemispheric Affairs

The U.S. state Department continues to test the use of herbicides to eradicate coca in Peru, despite concerns over the safety and ecological soundness of aerial spraying.

Since March, the State Department's Bureau of International Narcotic Matters (INM), in conjunction with Peruvian officials, has been conducting test sprayings of the herbicides tebuthiuron, known as "Spike," and hexazinone, or "Velpar," in Peru's Huallaga Valley, an area that annually produces a reported \$450 million worth of coca. These tests represent the latest push in a decade-long attempt by the U.S. to

destroy such crops in Peru, Columbia and Bolivia through aerial application of toxic chemicals.

Environmentalists have strongly criticized Washington for promoting the spraying, asserting that the chemicals are not approved for this type of application within the United States and therefore should not be used in the coca-producing region of South America, in an area with very fragile and increasingly endangered ecosystems.

In 1988, fearing liability for environmental damage, Eli Lilly, the producer of Spike, halted further sales of the chemical to the government for drug eradication after controversy broke

out over the issue. Despite this decision, the U.S. government has continued testing tebuthiuron in Peru.

In April the State Department issued an environmental assessment of possible hazards accompanying the use of six herbicides, including tebuthiuron and hexazinone, to eradicate coca in Peru. This report lacks important data, and many of the optimistic claims made for the defoliants have prompted skepticism about the appropriateness of their use in eradication programs.

None of the six herbicides is registered in the United States for food uses; yet Peruvian coca plantings are generally interspersed with food crops. Little data is presented concerning the possible health hazards to humans created by use of Spike or other herbicides. Reports of the toxicity of these chemicals to mammals, fish and birds range from "slightly toxic" in many cases to "highly toxic," as in the case of triclopyr, which Dow Chemical refused to continue selling to the U.S. government following a Washington-ordered spraying in Columbia in 1985.

Tebuthiuron presents many dangers to the rainforests, where much of Peru's coca cultivation is centered. Not only does Spike kill all broadleaf plants with which it comes into contact, it has been found to kill nearby

trees and other vegetation as well through aerial drift. The State Department's environmental assessment acknowledges at least minimal damage to non-target vegetation for each of the discussed herbicides. Most of the assessments of such hazards have been conducted within the United States however, and undoubtedly understate the environmental impact of spraying in Peru, where biodiversity is much greater.

The alarmingly high soil persistence of Spike (up to five years) results in land where nothing but grasses will grow as long as the chemical remains concentrated in the soil. The contaminated area is therefore very attractive to cattle ranchers who will cause even further deforestation once they take over lands previously used for cocaine cultivation. At the same time, any forced eradication program through aerial spraying will tend to encourage farmers to go elsewhere and deforest new plots of land for coca cultivation.

Erosion is another potential consequence of tebuthiuron use, as massive defoliation and the lack of rapid plant growth will cause the fragile soil structure to wash away, possibly contaminating the stream and river systems in the area. Spike can

potentially cause a great deal of harm when allowed into the water system.

Many environmentalists argue that the ecological consequences of spraying Spike or Velpar in the Amazon watershed are far too great, especially when, at best, only relocation of coca cultivation can be achieved. Eli Lilly, DuPont, and Dow chemical are all opposed to the use of their products for such use, as well. Ironically, even drug czar William Bennett has downplayed aerial herbicide application in Peru—not because of environmental concerns, but out of fear that spraying will increase peasant support for the Shining Path guerrillas, a group that already exercises considerable control in the Upper Huallaga Valley.

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Still
Time...

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Note: Membership benefits include The Canopy newsletter, notices of rainforest activities, and discounts on rainforest merchandise offered by the Alliance.

The Raising of *Dendrobates tricolor*

by: Milan Soukup (Prague, Czechoslovakia)

I have been raising *Dendrobates tricolor* for nearly five years (since 1984). These I obtained from the breedings of a friend. The size of the adult frogs is from 15 to 23 mm (0.6 - 0.9 inches). The females are larger than the males. This species, the raising of which is quite simple, is found in southwest Ecuador (Pacific drainage side) at elevations ranging from 1250 to 1750 meters (4098 - 5800 feet).

The enclosures that I use for raising these frogs are made entirely of glass. They measure 50 x 30 x 40 cm (19.7 x 11.8 x 15.7 inches). The substrate surface is divided into two parts, a dry side and a wet side. The dry side is planted with *Ficus pumila*, various *Bromilias*, *Philodendron* and *Scineapsus* species. The plants thrive well in the damp soil. The wet side of the enclosure contains washed river gravel, individual pieces of which range from 8 to 10 mm (0.3 - 0.4 inches). The water level generally reaches to 5 or 6 cm (2.0 - 2.4 inches). Heat is provided by a submersible

aquarium heater, regulated by a thermostat to approximately 26° C (78.8° F) during the day. At night the temperature is allowed to fall to approximately 18 to 20° C (64.4 - 68° F). The heater is covered by peat bog roots, which resist fungus growth. Two fluorescent tubes (20 watts each) provide light for between ten and twelve hours per day. Twice each day the water is passed through an automatic filtering device which is switch regulated.

Male *Dendrobates tricolor* first begin to call at approximately one year of age. The females begin to lay fertile eggs at an age of approximately 16 to 18 months. Throughout the entire period of time that I have been keeping these frogs I have attempted to give them as varied a diet as possible. I feed wingless *Drosophila*, small nymph crickets (*Gryllus bimaculatus* and *Gryllus domestica*) and other minute insects.

The number of eggs produced per clutch varies from between 6 to 15. The females deposit their eggs into petri dishes which I have

prepared in advance and have situated at various spots throughout the terrarium. Rarely they deposit their eggs in the rosettes of Bromelias. The eggs are harvested from the terrarium and placed in small dishes. I keep them at approximately 24° C (75.2° F). The water used with the eggs is adjusted so that the egg mass protrudes above the surface slightly.

Evidence of differentiation of the embryo is noted, usually, about the fourth or fifth day. The tadpoles emerge from the eggs on about the tenth day. After the tadpoles emerge I remove them to small water dishes where they are reared together. I begin to feed the tadpoles on the second day after their emergence from the eggs. I use TetraMin and TetraPhyll, both of which are products of a West German firm and are marketed as fodder for aquarium fish. Sometime between the thirtieth and the fortieth day, the rear legs begin to develop. The front legs emerge usually between the fiftieth and the fifty-sixth day. Full metamorphosis is accomplished by the sixty-fifth day after the deposition of the eggs. The small frogs are fed on wingless *Drosophila* and other minute insects.

On several occasions the larval stage has progressed more naturally in the water of the terrarium itself. The

number of frogs produced this way has always been fewer, usually only 2 to 4 individuals per clutch. Egg laying occurs relatively frequently, usually between 5 and 8 clutches per year for 2 or 3 year old females. I strive to obtain a 50% to 80% yield from each clutch.

I have had good experiences with the raising of *Dendrobates tricolor*. They are unpretentious wards with pleasing colours and terrariums of this species are very impressive.

BACK ISSUES NOW AVAILABLE!

All issues of the **ISSD** newsletter, from Volume I, #1 to the present issue, are now available for those who may have missed some and would like them now. Some editions are originals that were left over. However, some editions were out of print and had to be reprinted. Those that have been reprinted do not have the same heavy (and in some cases color) covers as the originals. The price for back-issues is \$3.00 per issue plus \$0.50 per issue for postage. Send requests and funds to: Ed Tunstall, 2320 West Palomino Drive, Chandler, Arizona, U.S.A., 85224.

Breeding Report on *Dendrobates variabilis*

by: Hans Zwoferink (Ryssen, Holland)

Introduction:

About two years ago I purchased four *Dendrobates variabilis* from a German friend. They were but two weeks old (i.e. two weeks post metamorphosis) yet possessed fully one-half their adult size. This interesting phenomenon was immediately noteworthy. I was able to feed them wingless fruitflies immediately and I did not have the trouble encountered in trying to provide food from mites and silver-fish. Those froglets which have since been bred by me from this original stock have similarly been fed from the very beginning on fruitflies and silver-fish (both of which are quite easy to breed). I would caution others not to overfeed them because they take on body weight extremely quickly. In the beginning I did overfeed mine and some of them soon became so fat that they could not walk and subsequently died.

Accommodation:

The terrarium in which my *D. variabilis* are kept is of the following dimensions; 75cm (h) X 40cm (l) X 40 cm (d). Approximately three-fourths of the space of the terrarium is occupied by plants. There is a small part of the tank which has been made into a water area. The back of the terrarium is covered with a 2cm thick sheet of cork. Lighting is provided by one 25 watt spotlight and a long T.L. lamp which lies on the tanks glass top. The lamps are set to go on and off together on a timer and they burn for 14 hours per day. The humidity is about 85% and the temperature stays at about 22° C at the soil surface and about 33° C at the top of the tank. To maintain the humidity I am sprinkling once per day, so that everything is saturated.

Morphology:

It is easy to confuse *D. variabilis* with other species such as *D. quinquevittatus* or *D. imitator*. There are,

however, some subtle morphological differences as well as behavioral differences. *D. variabilis* has a single black point in the middle of its forehead and a stripe on the nose which has on each side of it a black point. It has more color than *D. imitator*. It differs from *D. quinquevittatus* in that these have one point on the nose and two on the forehead. The size of the adult frogs of all three of these species is the same, about 1.8 cm..

Males of *D. variabilis* are smaller and thinner than females and the underside of the head, (the neck) is dark. The neck of the females is light in colour.

Egg Feeding:

Dendrobates variabilis is, in part, an egg-feeder. Tadpole transport to bromelias is sometimes by the female and sometimes by the male. Like *D. pumilio*, they transport them one at a time. The females feed the tadpoles with infertile eggs.

The Breeding:

The frog-lovers ultimate goal, of course, is to produce young frogs. And this is as it should be. This is already starting when you want to buy

some frogs (not wild caught, because of diseases). Often people will ask when they are buying the froglets, can you tell if it is a male or a female? With *D. variabilis* the difference is noticeable after only about one month, although it must be said that the accuracy is less than 100%. If they must be sexed accurately than it is best to wait until about eight months when they are sexually mature.

Egg production can be expected at about eight months. In this respect *D. variabilis* differs from most other dendrobatid species which mature between twelve and eighteen months. The first time that you hear the male making his sound you may think that you have a cricket in your house! The sound is identical. The call of the male is short, loud, and fast - time after time. Shortly you will notice the male and the female walking together throughout the terrarium. They are searching for a place to lay eggs. Most dendrobatid species lay their eggs on a horizontal surface such as a leaf or a petri dish. *D. variabilis* is a real "sticker", they stick their eggs everywhere, always on the vertical. You may find the eggs hanging on the glass or the cork or on a vertically oriented leaf.

I have in my tank three females and one male. They are laying eggs on

all possible places throughout the terrarium. A single clutch contains a maximum of four eggs, but usually it is two or three. The eggs are quite large to be from such a small frog. They are larger than *pumilio* and they are very light coloured. The first time that you see them you may think that they are not good, but after a few days they will begin to transform. As I mentioned, it is possible that the female may tend the larvae, feeding them with infertile eggs. It is possible to raise them yourself and this is what I prefer. In this way they differ from *D. histrionicus* which must be left to care for their larvae themselves. This is why I said earlier that they were egg-feeders in part. When the eggs are three days old I remove them from the terrarium and place them in a tray with a small amount of water. I keep them in a place where the temperature stays at 22° C. After twelve to fourteen days the tadpoles are free. Occasionally I have to help them a little bit. After this I put them in a biologically filtered rearing tank where the cannibalistic tadpoles are kept separate from each other. In this I use water from the kitchen tap and the temperature is kept at 20° C. I feed the tadpoles every day with a variety of fish foods, calcium and sometimes vitamins. After about two months the young frogs will take

to land, while they still have some tail. After two or three days the tail is gone and they begin to eat.

Conclusion:

Dendrobates variabilis is an excellent frog for anyone wishing to get a start with this hobby. They are beautifully coloured, black with metallic green, yellow or orange markings. They are not shy, they can be seen all the day long and the male is always whistling. They are easy to feed and do not necessarily require a large terrarium (although the bigger-the better).

NEWSLETTER EDITORSHIP AVAILABLE!

Volume II, # 6 will be the twelfth edition of the **ISSD** Newsletter. It is time to pass the torch to someone else. Plans in the works for a new Newsletter Editor to take over in January 1990 have suddenly changed and we find ourselves with a crisis. Who will edit the Newsletter next year? Anyone wishing to take this important job please contact Dale Bertram or David Hulmes as soon as possible!! Also, we are now putting forth an **urgent** call for new material for future editions. Those who have been promising material, but procrastinating on its delivery, **please** send it in immediately.

Updating Dendrobatid Nomenclature for Terrarists

By: Luuc Bauer (Den Haag, Holland)

Abstract:

Sedert enkele decennia mogen pijlgifkikkers en hun verwanten zich verheugen in een groeiende belangstelling van wetenschappers en liefhebbers. Naamgeving is daarbij geruime tijd aan twijfel onderhevig gebleven, maar de taxonomie van deze familie lijkt nu enigszins gestabiliseerd. Hier geef ik een overzicht van de huidige geslachten (genera) en hun kenmerken.

A table of dates, authors and names is supplied to give a historical perspective.

Two landmarks in Dendrobatid literature for non-scientific or non-technical people with an interest in these beautiful frogs have been the work done by Savage (1968) and Silverstone (1975, 1976). Nevertheless the general reader had to understand and possibly use some more technical characters for which close observation of the animals is important. Frog lovers and terrarium or vivarium keepers may develop their own skills in recognizing species and in reading more difficult literature as well.

Some twenty-five years ago, when Savage and Silverstone started their work, other herpetologists also developed an interest in the noxious Dart-Poison frogs; their work being made possible largely by the expanding interest of pharmaceutical companies in the potential medicinal use of skin toxins.

All this activity led to a better understanding of differences not previously appreciated, and subsequently to many new species being described. The number of known species grew and knowledge of the life histories and of the skin toxins accumulated. Myers and co-workers were the most productive researchers after Silverstone (if I may use this construction for the era we are

presently in).

Apart from accumulating data also a slight controversy as to the understanding of Dendrobatid genera became possible after the restriction (Myers c.s, 1978) of Phyllobates. Especially many Europeans were unhappy with the lumping of all species other than the bicolor-group in Dendrobates. In several publications, to this present time, the more understandable division into Dendrobates-like and Phyllobates-like species remains in use.

In the mean time however, other generic names have been proposed and should be used for a better grouping of the Paint-Colour frogs, Dart-Poison frogs, and Jump-Missile frogs or subfamilies Dendrobatinae, Phyllobatinae, Colostethinae.

The present genera arranged in subfamilies:

Dendrobatinae: chromosome number reduced, colourful pattern of irregular lines and spots, toxic, first finger short and finger discs enlarged, no teeth and no webbing, clutch small or very small; tadpoles having oral disc fairly simple and anus median.

DENDROBATES, type species *Dendrobates tinctorius*.

Karyotype known for *Dendrobates auratus*: each animal receives from both parents 9 chromosomes ($2N = 18$). Tadpoles may be carnivorous or cannibalistic.

DENDROBATES, complex 2 (?) may be closely related next genus.

Karyotype known for *Dendrobates pumilio*: each animal receives from both parents 10 chromosomes ($2n = 20$). Tadpoles often oophagous.

RANITOMEYA, type species *Ranitomeya reticulata*.

Karyotype not yet known. Tadpoles may be fed with unfertilized eggs, but this is seldom essential for their growth and development.

MINYOBATES, type species *Minyobates steyermarki*.

Karyotype not yet known, tadpoles not highly specialized. Comprises minutus-group of Silverstone without "quinquevittatus".

Phyllobatinae: chromosome number $2n = 24$, back brightly coloured or dorsal pattern dark with bright stripes, highly toxic; first finger not short and toepads enlarged; normally with teeth, no webbing; clutch moderately small; tadpoles having oral disc with upper and lower lip, anus dextral.

AMEEREGA, type species *Ameerega trivittata*.

This genus lacks teeth and lacks Batrachotoxins; dorsolateral lines begin on the snout, often go caudad as a brow over the eye, end in the groin.

PHYLLOBATES, type species *Phyllobates bicolor*.

Teeth present; production of Batrachotoxins, laterodorsal striping from eye to above the hindlegs (juvenile) or if adult, have their backs entirely bright.

PSEUDENDROBATES, type species *Pseudendrobates silverstonei*.

Teeth present, skin toxins without Batrachotoxins; dorsolateral striping from the eye and often bending into the groin or entirely bright.

Colostethinae: chromosome number $2n = 24$; coloration seldom very bright, scant toxicity, finger length varying, disc size varying, clutch varying, teeth present and often with webbing or traces thereof.

COLOSTETHUS, type species *Colostethus latinasus*.

Presumably will require splitting into several genera with respect to possible evolutionary position and variable characteristics.

EPIPEDOBATES, type species *Epipedobates tricolor*.

This genus has been restricted to the "femoralis" species group and contains fairly colourful species with traces of webbing.

In a future edition of our Newsletter an updated species list of Dendrobatids could prove a valuable help for aquarists/terrarians to reach a more uniform nomenclature for use in articles and oral communication. (EDITORS NOTE: Look for this list in Vol II, #6, NOV 89)

An arrangement by subfamilies has the advantage of reflecting external morphology (fingers, toepads, colour) as well as observed differences in breeding behavior and development. This arrangement honors Silverstone by largely using his dividing criteria as well as Myers c.s. by accepting the importance of biochemical criteria; it further has the merit of being in accordance with minor inconsistencies of other classifications.

DENDROBATES as a generic name for the type species and the 'auratus' species group brings no problem at all. The 'pumilio' and 'histrionicus' species groups, with their highly specialized reproductive biology, clearly together form a separate complex which might be fairly close to the less specialized forms of RANITOMEYA, which are morphologically similar in larval forms.

Although Silverstone considered *Dendrobates quinquevittatus* to be a species with many forms belonging to his 'minutus' group, observations of the different forms convinced me and others (Myers & Daily, 1980; see also Myers, 1982) that several forms are specifically distinct and that this group of species is not really part of the 'minutus' group for which Myers (1987) proposed the generic name of MINYOBATES.

Myers then also proposed EPIPEDOBATES as a generic name for species which had been considered by Silverstone as PHYLLOBATES and which became lumped under DENDROBATES after the restriction of PHYLLOBATES. The type species however is *Prostherapis tricolor*, known either as *Dendrobates* or as *Phyllobates* and sometimes even referred to as *Colostethus*, which being a member of the 'femoralis' species group, never could be satisfactorily classified. Actually, differences with the superficially similar or "look-alike" frogs of the 'pictus' group are to be found mainly in the possession of teeth and rudimentary webbing. They do not belong to one genus. For the other species without teeth I proposed the generic name of AMEEREGA in 1986. *Epipedobates* so had to be restricted to the 'femoralis' species group; and now

this group can be considered more closely related to the often less colourful COLOSTHETHUS.

This classification brings together species with morphological and behavioral common traits and produces generic separations understandable to terrarists and frog breeders, who from colour and patterning and reproduction, may discern between the same groupings. It is therefore to be hoped that the new names receive general acceptance soon.

LB

HISTORIC TABLE FOR DENDROBATIDAE:

1830	Wagler: Dendrobates included <i>Hyla nigerrima</i> , <i>Calamita tinctorius</i> , <i>Hyla trivittata</i> .
1841	Bibron: Phyllobates type species <i>Phyllobates bicolor</i> .
1841	Dumeril & Bibron: type species for Dendrobates is <i>Calamita tinctorius</i>
1843	Fitzinger: family name Phyllobatae forgotten or neglected by later authors.
1865	Cope: Dendrobatidae generally accepted family name.
1866	Cope: Colostethus type species <i>Phyllobates latinasus</i> .
1866 - 1966	Several species described as new; no new insights.
1968	Savage: Review of Central American Dendrobatidae.

- 1975 Silverstone: revision of the genus *Dendrobates*
- 1976 Silverstone: revision of the genus *Phyllobates*
- 1976 Myers & Daly: preliminary evaluation of skin toxins and vocalization, foreshadowing new taxonomy.
- 1978 Myers, Daly & Malkin: restriction of *Phyllobates* and description of the new species *Phyllobates terribilis* as being the most toxic animal known.
- 1978 Bechter: Das Ei des Columbus - *D. pumilio* & *D. lehmanni* breeding successes with egg yolk drops.
- 1980 Myers & Daly: resurrection of the name *Dendrobates reticulatus*.
- 1985 Bauer: new generic name *Ranitomeya*
type species *Dendrobates reticulatus*.
- 1986 Bauer: new generic name *Ameerega*
type species *Hyla trivittata*.
- 1987 Myers: new generic names *Epipedobates* & *Minyobates*,
type species *Prostherapis tricolor* & *Dendrobates steyermarki*.
- 1987 Myers & Burrowes: new species *Dendrobates andinus*,
considered by Myers to be a member of *Epipedobates*.
- 1988 Bauer: *Pseudendrobates* new generic name,
type species *Dendrobates silverstonei* and restriction of
Epipedobates to 'femoralis' species group.
- 1989 Present genera in the family Dendrobatidae are: *Dendrobates*,
Ranitomeya, *Minyobates*, *Phyllobates*, *Ameerega*,
Pseudendrobates, *Colostethus*, and *Epipedobates*. New generic

name for *Dendrobates/Epipedobates andinus*, and for some species still at present in *Colostethus* are to be expected.

---? Myers, Daly & Ford will publish a general treatment of toxic (=colorful) Dendrobatidae.

Comment: Type species often are mentioned with the name originally given. The new generic name being published makes the combination to be the correct zoological name and other combinations synonyms. So after 1830 *Calamita tinctorius* became *Dendrobates tinctorius*; in 1987 *Prostherapis tricolor* became *Epipedobates tricolor*, all other combinations with *Dendrobates* or *Phyllobates* are now synonyms.

LB

Classified Ads

WANTED: Lonely, long term captive male *D. lehmannii* and male *P. Bicolor* looking for suitable females of the same species. Object - matrimony. Both males are healthy and calling. Anyone with females please contact: Ann Jesup, 183 Fox Den Road, Bristol, CT, U.S.A., 06010.

FOR SALE: Large plexiglass (cube shaped) tanks with full hood, professionally made. Designed specifically for dendrobatid breeding colonies. Also make beautiful show terrariums. Flame polished edges and corners; 30" X 24" X 24". Extra height for large plants. \$150.00 each, 5 available. Also, wingless fruit fly cultures at 1/2 the price of supply houses. Minimum order 12. A recent purchase of Poison-Dart collection netted extra books, cultures, etc.. Call for details. Jim Reilly (201)-292-0544.



**ISSD invites anyone
with an interest in the
study of Dendrobatid
Frogs to participate in
its membership.**

Membership Registration:

Name: _____

Address: _____

Phone #: _____

Date: _____

Comments: _____

Annual membership dues are as follows: \$20.00 for members living in the U.S.A. and Canada; \$25.00 for members living in Europe and South America. For members holding a personal checking account with a U.S. bank - a personal check (made out in U.S. dollars and made payable to ISSD) will suffice. For those who do not have an account with a U.S. bank - payment should be made using one of the following methods (listed in order of preference): 1.) A U.S. Postal Money Order made out in U.S. dollars. 2.) A Cashier's Check from a U.S. bank, or U.S. affiliate of a non-U.S. bank, made out in U.S. dollars. 3.) A Cashier's Check from a non-U.S. bank, made out in the normal currency of the bank of issue, for an amount which will yield \$28.00 when it is exchanged. 4.) Cash -U.S.\$, wrapped well so that it cannot be seen through the envelope, and sent via Registered Mail.

Send registration forms and dues to:

ISSD - c/o Ed Tunstall
2320 West Palomino Drive
Chandler, Arizona
85224 U.S.A.